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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/660,561	09/12/2003	Jeong-Wook Lee	030681-572	5312

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EXAMINER

MULPURI, SAVITRI

ART UNIT PAPER NUMBER

2812

DATE MAILED: 02/01/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/660,561

Applicant(s)

LEE ET AL.

Examiner

Savitri Mulpuri

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE ____ MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 September 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-16 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-16 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|--|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date ____ | 6) <input type="checkbox"/> Other: ____ |

DETAILED ACTION

This action is in response to the applicant/s communication filed on 9/12/2003.

Priority

Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Claim Rejections - 35 USC § 102

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

Claims 1-6, 9, 11-16 are rejected under 35 U.S.C. 102(a) as being anticipated by Zhang et al (2003/0010971).

Zhang et al teaches a method of manufacturing a device by the following process steps:

Sequentially stacking a first semiconductor layer "82", a mask layer "96" and a metal layer "84" on a substrate (see fig. 5B);

anodizing the metal layer to transform metal layer into a metal oxide layer "86" including a plurality of nanoholes "88" (see fig. 5C)

etching the mask layer using the metal oxide layer as an etch mask until the nanoholes "98" are extended to the surface of the first semiconductor layer (see fig. 5D);

removing the metal oxide layer by etching; and depositing a second conductive not eh mask layer and the first semiconductor layer "90a, 90b, 92" (see fig. 5D- 5F and para. 0041).

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In re. to cl. 2, the diameter of the nanoholes is 10 to 100 nm(para. 0038, lines 1-8).

In re. to cl. 3, Zhang et al the area of the holes are inherently less than 50 percent of the whole area by showing metal oxide "86" wider than nanoholes "88" (see the fig. 5 C)

In re cl. 4 mask thicknesses must inherently same as claimed thickness., because both Zhang et al and instant invention has same goal of nanoholes with same diameter.

In re. to cl.5, Zhang et al uses a substrate made of GaAs and semiconductor layer made of AlGaAs and both GaAs and AlGaAs have different lattice constants.

In re. to cl. 6 the substrate is GaAs(see fig.5A)

In re. to cl.9 , cl. 11 the mask is dielectric layer of silicon oxide "96"

In re. to cl. 12-14 Zhang further use refractory metal such titanium along with aluminum as metal layer, wherein titanium along with aluminum for good adhesion(see page 4, para. 0029).

In re. to cl. 15 etching is ion etching, which is dry etching (see para 0028, last 6 lines).

In re cl. 16 electrical charge storing material material of semiconductor "90a ,90b) is deposited in nanoholes.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 7-8, 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhang et al in combination with Tsakalakos et al (US 20040077156).

Zhang et al do not teach growing GaN based compound semiconductor layer in the nanoholes.

Tsakalakos et al teaches growing GaN based compound semiconductor layer in the nanoholes. Tsakalakos et al teaches also teaches forming nanoholes in the mask of dielectric material "302" (see fig. 4) or semiconductor of GaN based material "102" (see fig. 5).

It would have been obvious to one of ordinary skill in the art to grow GaN based semiconductor materials in the invention of Zhang et al because compared to GaAs, GaN has large band gap material and so can withstand high temperature and withstand high voltages during performance, it has higher peak carrier velocity, versatile for making several types of devices and good for high frequency operations. It also would have been obvious to use either dielectric or semiconductor material because art recognized equivalence of using both types material as taught in Tsakalakos et al.

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The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Prior art, in general, teaches forming GaN layers and nanoholes in the mask.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Savitri Mulpuri whose telephone number is 571-272-1677. The examiner can normally be reached on Mon-Fri from 8 a.m to 4.30 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Lebentritt, can be reached on 571-272-1783. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Savitri Mulpuri
Primary Examiner
Art Unit 2812